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Land Management in Canada's North.

John K. Naysmith
Chief, Water, Forests & Land Division.

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LAND MANAGEMENT IN CANADA'S NORTH

Abstract

The author discusses some of those problems which are common to the management of air and land. The approach to conserving Canada's northern lands is based upon the concept of "managed-use". Here the emphasis is on utilization but under conditions which minimize disturbance. The objective is to minimize alteration of the resource-base while accepting the fact that if the land is to be used some degree of disturbance is unavoidable.

For purposes of discussion the subject is considered under three general categories. The first describes the situation which existed prior to instituting land-use management in the north, followed by a resume of the various elements of the program undertaken. Finally, some of the economic implications of environmental management are considered. The author suggests that irrespective of whether interest is focussed on the management of air, water or land the hard economics of these programs must now be addressed.

John K. Naysmith,
Chief, Water, Forests and Land Division,
Department of Indian Affairs and Northern Development.

The Setting

The area which we are to consider stretches from the Atlantic Ocean on the east to within a few miles of the Pacific Ocean on the west and roughly as close to the North Pole as Regina is to Calgary. Put another way the total area of the Yukon and Northwest Territories is equal to that of Manitoba, Ontario, Quebec and the four maritime provinces or nearly double the area of Alaska and Texas combined.

In addition to its immensity it is a land of considerable contrasts. This latter point is particularly important when considering a land management program. To the west the mountains of the Yukon form the northern part of the Cordilleran Region of North America. Immediately east of the Mackenzie Mountains, which roughly separate the Yukon from the Northwest Territories, lie the Interior Plains. These plains, a continuation of the Great Plains that stretch from the Gulf of Mexico are dominated by the 1100 mile long Mackenzie River which flows northward to the Beaufort Sea.

East of the Interior Plains lies the Precambrian Shield, consisting of 700,000 square miles of bedrock. Except for the rugged mountains of the eastern Arctic Islands the height of the Shield rarely exceeds more than a few hundred feet. In the eastern Arctic Islands the Precambrian rocks form a spine of mountains from Baffin to Ellesmere Island which rise to heights of 10,000 feet with spectacular vertical cliffs and deep fiords along the Atlantic coast.

Archaeological sites in the Territories indicate that the first humans in Canada were located in that region at least 7,000 years ago. For several thousand years prior to the white man's arrival the Indians and Eskimos who inhabited this region evolved and maintained successful cultures while living in close harmony with the land. The European explorers of the 16th, 17th and 18th centuries were the first white men to contact the Indians and the Eskimos. The explorers were followed by whalers, fur traders, prospectors, missionairies and pioneer settlers. Small settlements grew along the main waterways and introduced a new way of life to the North. In spite of this relatively long history the combined populations to-day of the two Territories is only 50,000 of which 20,000 are Indians and Eskimos.

When confronted in 1969 with the task of developing a land management program for this vast area the situation appeared as follows. Except for a limited forest fire protection program in the southern Yukon and the Mackenzie River valley of the Northwest Territories the federal government's emphasis with respect to

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northern natural resources was directed almost entirely to the non-renewable side. The Territorial Lands Act simply provided for the disposal of surface rights but in effect there was no means for controlling land use prior to the issuing of a surface lease. Indeed even when leases were issued, few conditions were placed upon the lessee with respect to how the land was to be used.

It followed from this, therefore, that the "other" values of the resource-base, for example, the aesthetic, recreational, hunting, trapping, wildlife and productive capacity of the land were not being recognized. If there was virtually no control over the private sector with respect to land-base operations, there was equally no control over government activities such as the construction of roads, airstrips and power line rights-of-way.

Scientific and technical investigations had been underway in the north for several decades. However, there appeared to be little co-ordinated effort between industry, university and government researchers and virtually no consideration given to the impact upon the water, land and wildlife of various kinds of technological activity.

Finally, there was no apparent mechanism through which industry, conservationists and universities could share in developing policy with respect to land-use in the north nor was there any effective field organization capable of implementing a land-use program.

The Program

(1) Act Amended

The type of regulatory control required to manage northern lands was not possible given the legislation existing in 1969. The Territorial Lands Act provided authority for the disposition of Crown Land in the Territories through sale and surface leases but did not cover the required elements of protection and controlled use.

In view of this, an amendment to the Territorial Lands Act was passed by the House of Commons and given Royal Assent in June 1970.

The purpose of the amendment is to provide a legislative base for the promulgation of regulations which will provide a measure of control over the types and methods of northern resource exploration, development and restoration procedure in order to minimize degradation of the land surface.

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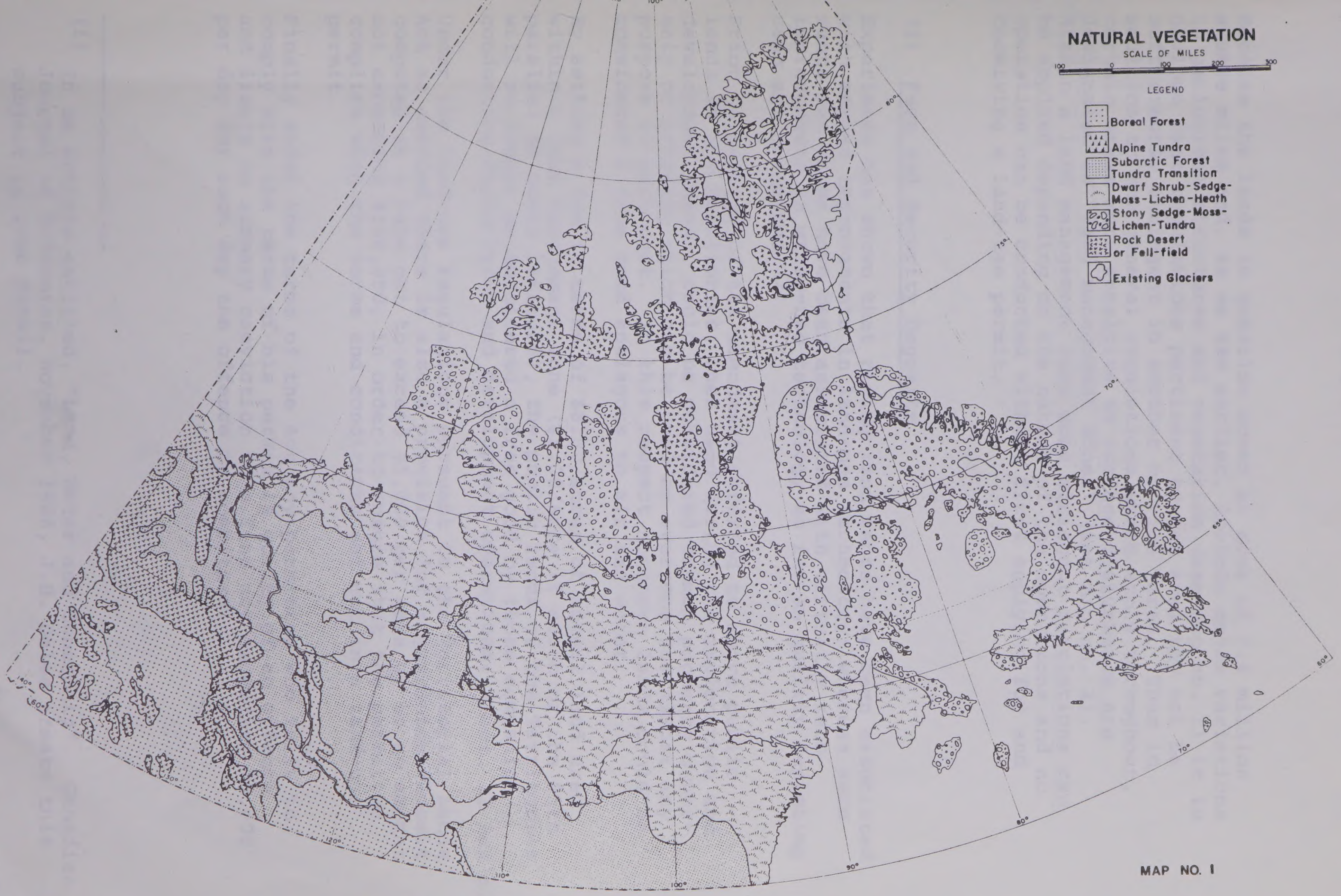
SCALE OF MILES
100
0
100
200
300
LEGEND
Boreal Forest
Alpine Tundra
Subarctic Forest Tundra Transition
Dwarf Shrub-Sedge-Moss-Lichen-Heath
Stony Sedge-Moss-Lichen-Tundra
Rock Desert or Fell-field
Existing Glaciers
80°
75°
70°
65°
60°
50°
140°
130°
120°
110°
100°
90°
80°
70°

NATURAL VEGETATION

MAP NO. 1

Because the lands in question cover an area of 1.4 million square miles and, as we saw earlier, include major variations in geological structures and vegetation (see map no. 1) it is obvious that regulations pertinent to one area may not be sufficiently stringent in another or vice versa. Thus in addition to the general regulations which apply throughout, certain areas more sensitive to surface disturbance are designated as "land management zones" (see map no. 2). Within a land management zone more stringent regulations can be applied depending on the nature of the operations and no operation can be conducted without first applying for and receiving a land-use permit.

(2) Fees and Security Deposits

Experience has shown that rising land rents have been associated with marked improvements in land-use technology; whereas zero rents for water have been associated with virtually zero improvements in water-use technology so far as quality depleting uses are concerned.(1)

Prior to passage of the amendment referred to above public lands in the Territories, when used during the exploration and development phases, could be considered common property ownership or property which can be used by everyone for almost any purpose at zero cost. In this respect northern lands could be considered a free good analagous to air and water.

By setting a fee in terms of $8.00/acres of actual land used within a land management zone ($5.00/acre if north of the 65th parallel of north latitude), the public lands of the Territories will no longer be considered a free good by those companies conducting exploration and development operations. (Sect. 22 Reg's)

Under the land-use regulations pursuant to the Territorial Lands Act as amended there is also a provision for a guarantee deposit computed at a rate not to exceed $1,000 per acre up to an amount not exceeding $100,000, in order to ensure that the permittee complies with the terms and conditions set out in a land-use permit.

Finally under the terms of the Act any permittee who fails to comply with the terms of his permit is guilty of an offence and liable on summary conviction to a fine not exceeding $5,000 per day for each day the offence is committed.

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(1) In an article entitled, "Land, Water and Ownership". Canadian Journal of Economics, November 1968, J.H. Dales treats this subject in some detail.

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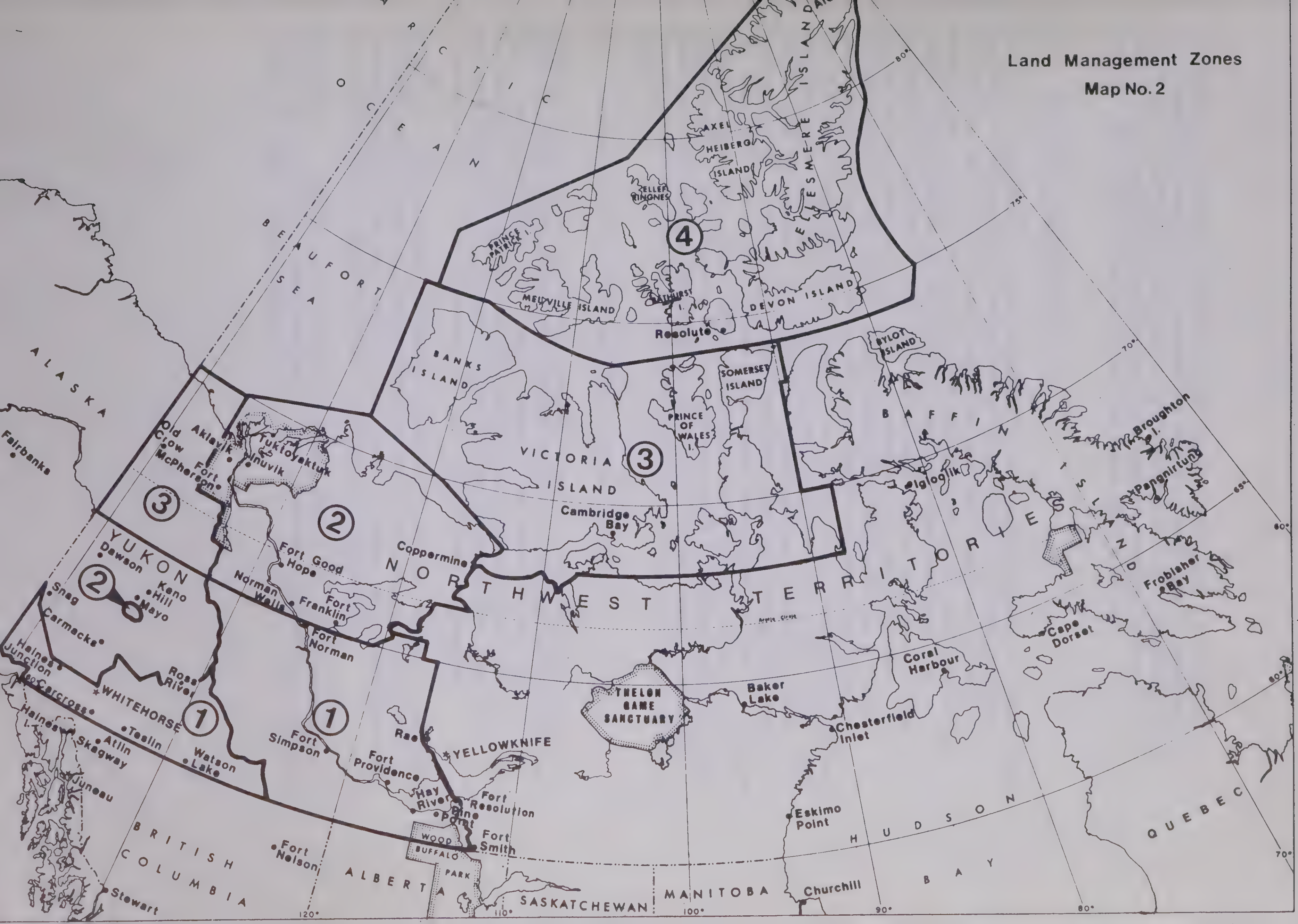
Land Management Zones

Map No. 2



Presumably the application of a land rent, the provision in the regulations for a guarantee deposit and the liability for failure to comply with terms or conditions of a permit will result in the development of improved technologies and ultimately the minimizing of land-surface degradation.

(3) Land-Use Regulations

With the passage of the Amendment to the Territorial Lands Act in 1970 the next step was to develop a set of regulations. As stated earlier it had been recognized that no formal mechanism existed by which various sectors of the community could particpate in developing policy with respect to northern land use. The way now seemed open and an advisory group was formed to aid the government in writing the regulations. The group comprised representatives of the petroleum industry, the mining industry, conservationists, the university community and government. Several drafts were written and during this period consultation was held with the Yukon and Northwest Territories governments, other federal departments, industrial associations and conservation groups. In June 1971, draft regulations were published in Part I of the Canada Gazette providing all interested parties with a final opportunity to present their views on the proposed regulations. Several representations were made which resulted in further changes and in November 1971 the Land-Use Regulations became law.

The Regulations are divided into three parts:

PART I - lists a series of general regulations which apply to any land-use operation conducted anywhere in the Territories. These regulations refer specifically to excavation, water crossings, highway and road crossings, clearing of lines, trails or rights-of-way, archaeological sites, campsites and fuel storage facilities, removal of buildings and equipment.

PART II - deals with land-use operation to be conducted within a land management zone and refers to application for permit, inspections prior to issuing a permit, terms and conditions of a permit, fees, final plans and security deposits.

PART III - refers to the duties and powers of an inspector, default of operator, suspension of a land-use operation, cancellation of permit and appeals.

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Section 21. of the regulations, which deals with terms and conditions of permits, in effect provides for the setting of specific stipulations for any land-use operation within a land management zone. Included in any land use permit may be conditions respecting the following:

(a) the location and the area of lands that the operator may use;

(b) the times at which any work or activity forming part of the land use operation may be carried out;

(c) the type and size of equipment that may be used in the land use operation;

(d) the methods and techniques to be employed by the operator in carrying out the land use operation;

(e) the type, location, capacity and operation of all facilities to be used by the operator in the land use operation;

(f) the methods of controlling or preventing ponding of water, flooding, erosion, slides and subsidences of land;

(g) the use, handling and ultimate disposal of any chemical or toxic materials to be used in the land use operation;

(h) the protection of wildlife habitat;

(i) the protection of objects and places of recreational, scenic, and ecological value;

(j) the deposit of a security deposit in accordance with section 26; and

(k) such other matters not inconsistent with these Regulations as the Engineer thinks necessary for the protection of the ecological balance or physical characteristics of the land management zone.

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(4) Arctic Land Use Research Program (ALUR)

In the course of developing land-use regulations and through discussions with the oil and gas industry, the mining industry, conservation groups and various government agencies, it was evident that few data relating to the effects of man-made disturbance to northern lands were available. Thus ALUR was established to provide a scientific base for the setting of land-use regulations and pursuant stipulations. The terms of reference for ALUR are as follows:

1. To detect and define environmental problems associated with northern resource development and particularly those problems associated with land-use operations used in the exploration and development phase of resource exploitation in the far north.
2. To compile base line information, where available, on undisturbed northern ecosystems for use as control data in measuring the environmental effects of land-use operations.
3. To devise and test alternative resource exploration and development operating procedures where it is found that present procedures result in unacceptable levels of damage to the land surface.
4. To make recommendations on the basis of data obtained from the research program, respecting the type and degree of restrictions to be imposed on northern land use operations in various areas or zones of northern Canada.
5. To publish and disseminate data respecting northern land use operations to:
    - (i) resource exploration industries;
    - (ii) interested government departments; and
    - (iii) universities and the scientific community in general.

An advisory board, similar to the one formed to aid the government in drafting the Land-Use Regulations, was established to set in motion and provide direction to the ALUR program. The board, consisting of representatives of the petroleum industry, the mining industry, conservation groups, Canadian universities, and the Department of Indian Affairs and Northern Development, is responsible for identifying problems, with respect to land and fresh water, resulting from industrial activity and des-

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cribing the kinds of research necessary to deal with these problems. This advisory board, so constituted, has proved extremely successful in bringing considerable expertise from various and diverse sectors to bear upon a single program and, almost of equal importance, has resulted in better utilization of research resources throughout industry, university and government.

(5) Field Organization

Prior to 1969/70, the organization in the Territories responsible for the renewable resource program of the Department consisted of the Yukon Forest Service with headquarters in Whitehorse and the Mackenzie Forest Service with headquarters in Fort Smith, N.W.T. Both organizations were relatively small and confined their activities to forest fire protection and some forest management programs. In 1971, a re-organization of the two regional offices in Whitehorse and Yellowknife saw the creation of an office of Manager, Water, Forests and Land for each region, and the formation of two Lands and Forests Services. New District and Divisional offices were created in the Yukon and Northwest Territories and a staff of Resource Management Officers (including the forestry officers from the original organization) were given the task of implementing the new land-use program. By 1972, there will be 150 full time positions in the two territories managing the Department's renewable resource program.

(6) Environmental Atlas

The purpose of the Atlas is to provide field personnel with an "early warning device" when responding to applications for land use permits. The maps showing the location of "other values" will provide some guidance in determining what special conditions, if any, should be attached to a particular permit. The Atlas will depict, on maps at the scale of 1:250,000, geographic areas or locations which reflect various values of the land. These will include:

- (i) areas of recreational and aesthetic value;
- (ii) wildlife migration routes;
- (iii) nesting, feeding and calving grounds;
- (iv) hunting, fishing and trapping areas;
- (v) known and probable archaeological sites;
- (vi) sites of historic and scientific importance.

The first phase of the program which covers the Mackenzie River Valley area from Great Slave Lake to the Beaufort Sea and the

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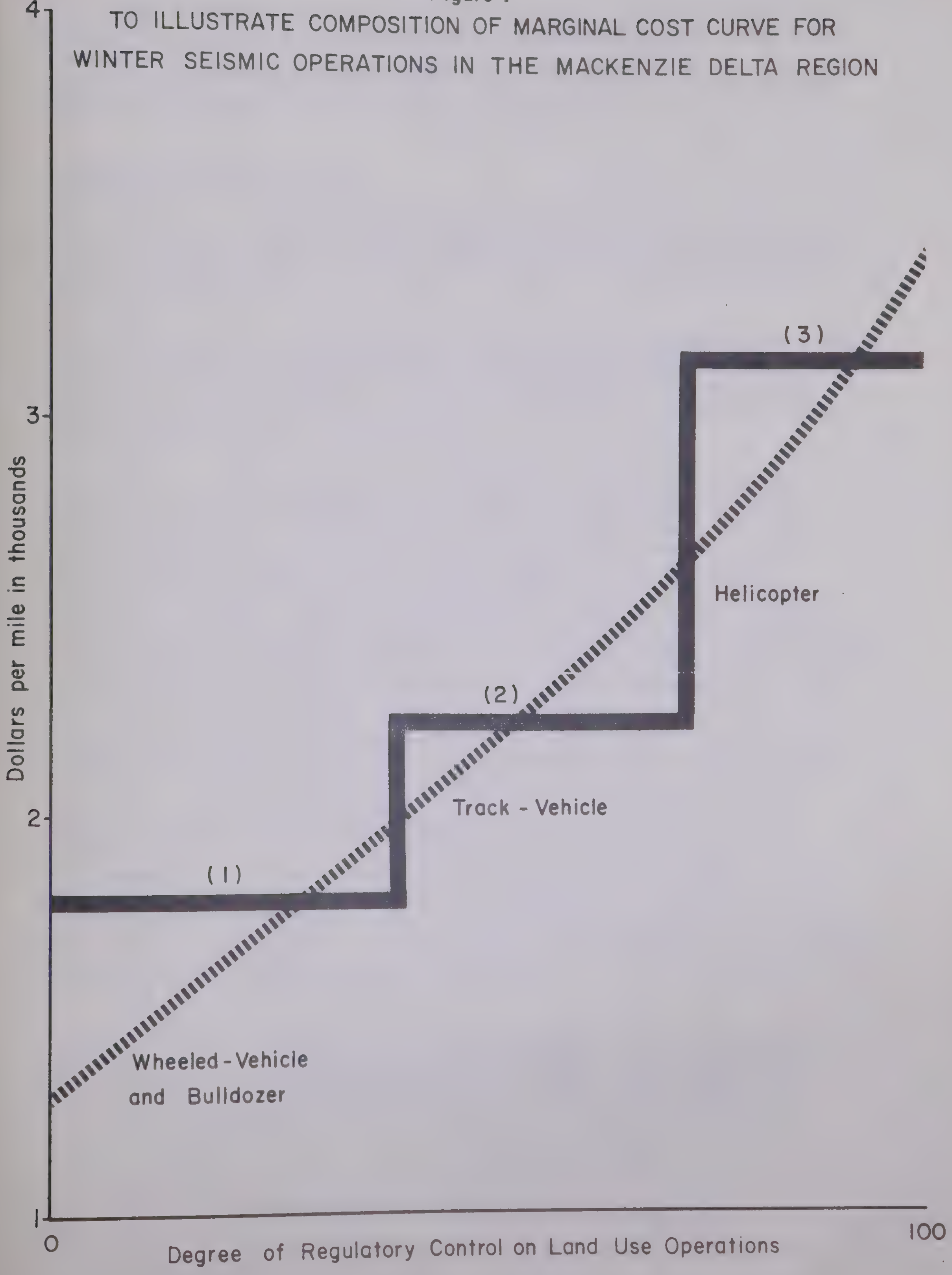
Figure 1

TO ILLUSTRATE COMPOSITION OF MARGINAL COST CURVE FOR WINTER SEISMIC OPERATIONS IN THE MACKENZIE DELTA REGION



northern portion of the Yukon Territory, will be completed by April, 1972 and will consist of 45 map sheets. In addition to being used by departmental personnel in the field, industry has expressed a keen interest in using the maps in planning their land-use operations.

A Question of Economics

There is almost unanimous acceptance to-day that Industry and Government should share common objectives with respect to minimizing alteration of the natural state of our air, water and land.

One dimension of this concept of managing our resources is yet to be fully discussed and that is the question of economics. Definitely, it is a concept with a price tag and in some way economics should define the degree to which regulatory controls are applied.

The problem cannot be easily resolved; the chief reason for this is the difficulty in quantifying those benefits derived from reducing environmental alteration. On the other hand, the costs incurred by applying regulatory controls can be fairly readily determined. For example, a geophysical exploration company operating in the Canadian north can quickly identify increased costs resulting from increased restrictions imposed on its operations. The point can be illustrated by plotting the costs to conduct a seismic operation under varying degrees of regulatory control (See Fig. No. 1). It can be seen that regulations calling for the use of track vehicles and prohibiting the use of standard wheeled vehicles and bulldozers increases the cost by $450 per mile. If the proposed area is particularly sensitive to alteration, the degree of restriction might include Step 3, thereby limiting operations to the use of helicopters for the transportation of all equipment. In these circumstances, costs would rise by another $900 per mile. Put another way, if the petroleum industry was to carry out 10,000 miles of seismic work in the Canadian Arctic in one year (not an unlikely figure to-day), depending on the degree of restriction imposed, the additional costs could amount to 13 or 14 million dollars.

Turning to the public sector, we see from Fig. 2 the increased cost to government of conducting its land management program in Canada's north. In 1970, the total cost including research was approximately 2 million dollars,

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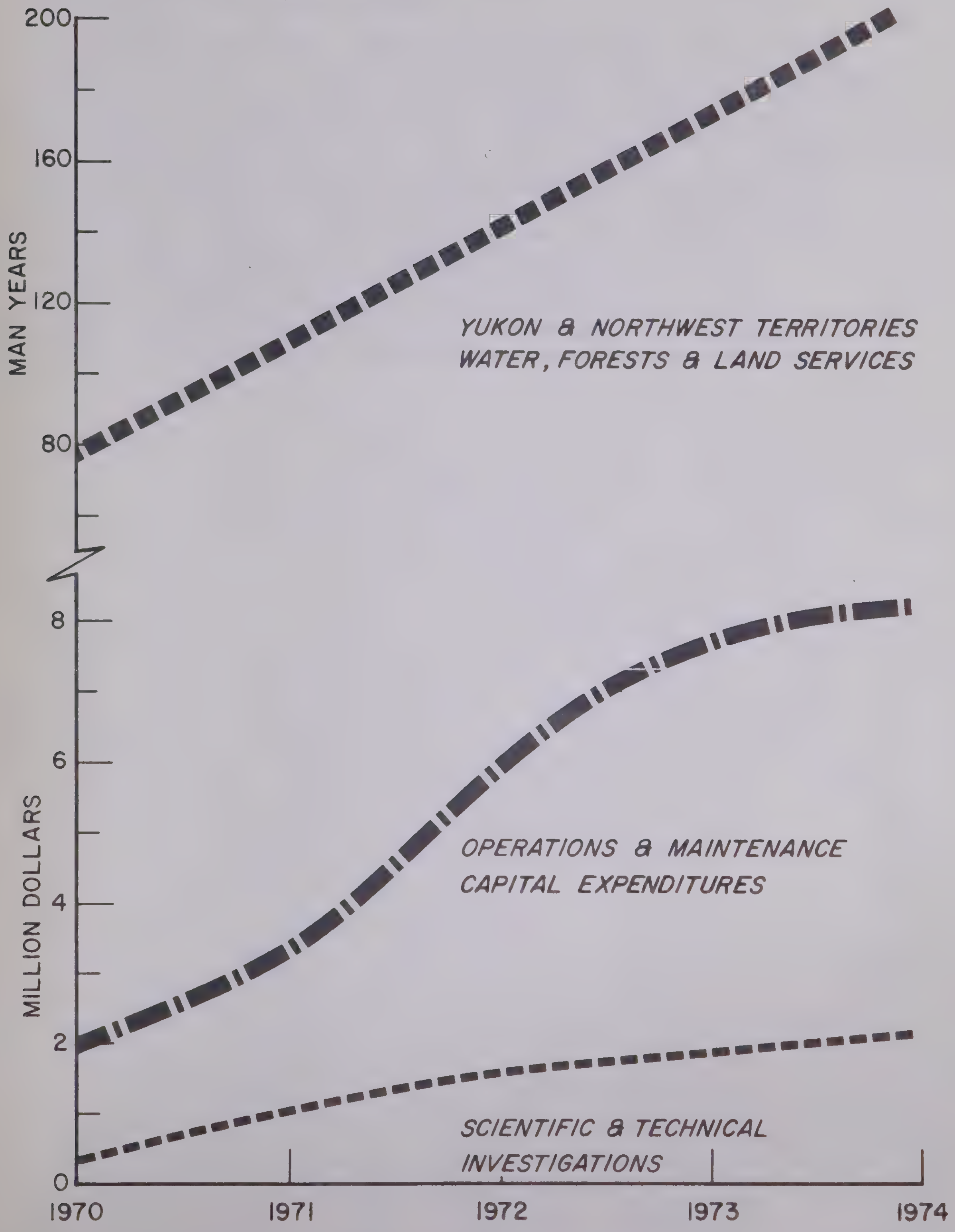
Figure 2

WATER, FORESTS & LAND DIVISION-NORTHERN PROGRAM

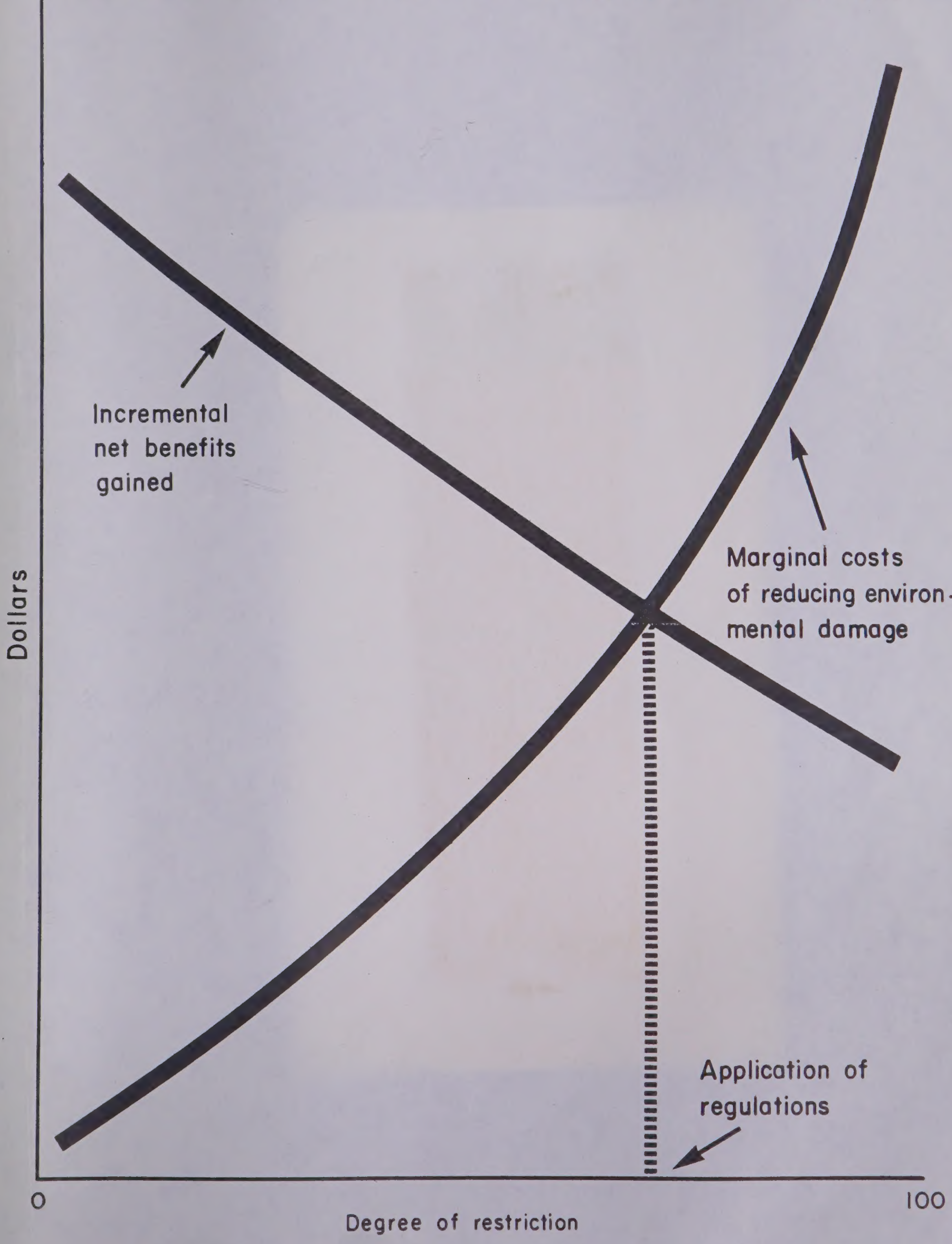


to-day it is 5 million dollars and by 1974, this will have doubled to 10 million dollars.

It could be said that the total cost to the public and private sectors of conducting a highly restrictive land-use program in Canada's north might approach 25 million dollars per year. The obvious question is what is the value of the benefits to be derived from such a program. It might be said that marginal costs tend to infinity and incremental net benefits to zero as the degree of restriction is increased (Fig 3). Until we have a clearer understanding of what the value of the benefits are, the degree of restriction placed upon the private sector is, unfortunately, an arbitrary one. Quantifying the benefits accruing from environmental regulations may not be a simple task but considering the magnitude of the stakes, it is a question that warrants our immediate attention.

Figure 3

MARGINAL BENEFITS & COSTS OF ENVIRONMENTAL REGULATIONS



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